

U.S. Department of the Interior
Bureau of Land Management
White River Field Office
220 E Market St
Meeker, CO 81641

DETERMINATION OF NEPA ADEQUACY (DNA)

NUMBER: DOI-BLM-CO-110-2011-0042-DNA

CASEFILE/PROJECT NUMBER: COC69166

PROJECT NAME: Shell Frontier Plan of Development (POD) for Oil Shale Research Development and Demonstration (RDD) Lease COC-69166 and Sodium Preference Right Lease COC-0120057

LEGAL DESCRIPTION: Sixth Principal Meridian
T2 S, R98 W
Sec. 4: Lots 9, 10, 15, and 16;

APPLICANT: Shell Frontier Oil and Gas Inc. (Shell)

ISSUES AND CONCERNS: None.

DESCRIPTION OF PROPOSED ACTION:

Background/Introduction: In January 2007, Shell Frontier Oil and Gas Inc. (Shell) received the Oil Shale Research, Development and Demonstration (R,D&D) Lease COC69166. Prior to the lease issuance the Bureau of Land Management (BLM) conducted an environmental assessment ([CO-110-2006-117-EA](#)) for a Proposed Action to address oil shale RD&D projects in accordance with BLM's Oil Shale RD&D Program announced in the Federal Register (FR, June 9, 2005, Vol. 70, No. 110). The analysis was based on Shell's Plan of Operations 2nd Generation ICP (Insitu Conversion Process) Project. In 2008 Shell received approval of the "Addendum to the Plan of Operations for the 2nd Generation ICP Project Shell Frontier Oil and Gas Inc. Lease COC 69166". This addendum reduced the size of the research operation and includes recovery of shale oil below the fresh water aquifer zones of the Green River Formation without implementing freeze wall technology. In 2009 Shell received approval of their appraisal program to drill geo-hydro wells located on three well pads: 135-4-298, 137-4-298, and 138-4-298. Terms of the lease require the operator to submit a detailed Plan of Development (POD) for approval.

Proposed Action: A detailed POD has been submitted by Shell for a pilot test. The designed project initially removes the nahcolite resources from a zone 40 foot diameter by 153 foot in height. The mining zone is located below the freshwater aquifer zones of the Green River Formation. Nahcolite resources are solution mined through a single injection recovery well using hot water. Once the nahcolite is mined the water remaining in the leached area is removed and down hole heating of the leached zone commences. This heating phase employs down-hole

electrical heaters in 13 designated heater holes to pyrolyze the oil shale. Two producer wells are utilized to remove the produced oil. There are also 6 observation wells for a total of 21 wells associated with the production of the shale oil recovery. It is anticipated a minimum of 1,500 barrels (bbl) of shale oil would be produced with peaked daily rate of greater than 10 barrels per day. Pyrolysis of the oil shale will be contained within the mining interval.

The surface processing facilities will cool and separate the produced fluids and gas. Fluids will be stored in tanks until trucked off site and the gases will be sent to the flare.

Total water usage for the 7 year project is estimated at approximately 142,000 bbl (12,200 barrels for drilling, maximum of 53,750 bbl for leaching, 40,560 bbl for dust control, 18,200 bbl for construction, 14,600 bbl cavity fill, 2,555 bbl personal use by employees).

Construction is scheduled to commence in early 2012 upon completion of required permitting. Hydrocarbon production is tentatively scheduled to be complete by the end of 2015. This schedule is the minimum estimated project time and may extend beyond 2015.

Approximately 21 acres containing the processing wells and facilities will be enclosed with a game proof fence of a minimum height of 8 feet (See attached maps). Surface disturbance within the fenced area is approximately 15 acres compared to 110 acres of disturbance analyzed in environmental assessment (EA) CO-110-2006-117-EA.

LAND USE PLAN (LUP) CONFORMANCE REVIEW:

Name of Plan: White River Record of Decision and Approved Resource Management Plan (ROD/RMP).

Date Approved: July 1, 1997

X The Proposed Action is in conformance with the LUP because it is specifically provided for in the following LUP decision(s): Minerals, Oil Shale page 2-6

Decision Language: "...At the discretion of the Secretary of the Interior, research scale lease tracts will be considered within lands available for oil shale leasing. Approval of research tracts will be based on the merits of the technology proposed."

REVIEW OF EXISTING NEPA DOCUMENTS:

List by name and date all existing NEPA documents that cover the Proposed Action.

Name of Document: White River Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement (PRMP/FEIS).

Date Approved: July 1, 1997

Name of Document: CO-110-2006-117-EA “Shell Frontier Oil and Gas Oil Shale Research, Development and Demonstration Pilot”

Date Approved: 11/09/2006

List by name and date any other documentation relevant to the Proposed Action (e.g., biological assessment, biological opinion, watershed assessment, allotment evaluation, and monitoring report).

Name of Document: U. S. Fish and Wildlife Service (USFWS) Biological Opinion ES/GJ-6-CO-94-F017

Date Approved: 09/12/2006

NEPA ADEQUACY CRITERIA:

1. Is the new Proposed Action a feature of, or essentially similar to, an alternative analyzed in the existing NEPA document(s)? Is the project within the same analysis area, or if the project location is different, are the geographic and resource conditions sufficiently similar to those analyzed in the existing NEPA document(s)? If there are differences, can you explain why they are not substantial?

Documentation of answer and explanation: Yes, the proposed Plan of Development is within the 160 acre R,D&D Oil Shale Lease tract COC69166 and access ROW analyzed in CO-110-2006-117-EA. The proposed appraisal project will affect approximately 21 acres of surface area compared to the 110 acres analyzed in the existing NEPA document. Although specific locations of production facilities, infrastructure, extraction wells and groundwater monitoring pads are not identified in CO-110-2006-117-EA, impacts associated with the construction of facilities for the overall project are included in the analysis.

The Proposed Action identifies a shorter nahcolite/oil shale recovery interval of 153 feet instead of approximately 450 feet in height implementing 12 heater wells compared to 100 heater wells analyzed in the existing NEPA. Also proposed is minimum production of 1,500 barrels of shale oil. Peak rate will be greater than 10 barrels per day compared to the 1,500 barrels per day analyzed in CO-110-2006-117-EA.

Existing NEPA analyzed the effects of constructing and implementing a freeze wall. The Proposed Action does not propose the implementation of a freeze wall due to:

- controlled process pressure,
- a nitrogen blanket to preclude contact between circulating solution and the top of the leach zone
- a barrier cap of non permeable oil shale between the recovery zone and the overlying aquifer system to isolate the overlying aquifer zones from the sodium and shale oil recovery zone.

These changes reduce effects to other resources while allowing for the Proposed Action of shale oil recovery to remain within what is analyzed in CO-110-2006-117-EA.

2. Is the range of alternatives analyzed in the existing NEPA document(s) appropriate with respect to the new Proposed Action, given current environmental concerns, interests, and resource values?

Documentation of answer and explanation: CO-110-2006-117-EA has a sub-alternative, a no action alternative, and two alternatives considered but not analyzed in detailed. No reasons were identified to analyze additional alternatives and these alternatives are considered to be adequate and valid for the Proposed Action.

3. Is the existing analysis valid in light of any new information or circumstances (such as, rangeland health standard assessment, recent endangered species listings, updated lists of BLM-sensitive species)? Can you reasonably conclude that new information and new circumstances would not substantially change the analysis of the new Proposed Action?

Documentation of answer and explanation: CO-110-2006-117-EA was approved 11/09/2006 and since then no new studies or resource assessments have been undertaken that changes the validity of the analysis.

4. Are the direct, indirect, and cumulative effects that would result from implementation of the new Proposed Action similar (both quantitatively and qualitatively) to those analyzed in the existing NEPA document?

Documentation of answer and explanation: CO-110-06-117-EA analyzed the overall affects of shale oil recovery project for Shell's Oil Shale lease tract CO-C69166 that includes disturbing up to 110 acres of surface area: drilling of production, heater, freeze wall, water, and groundwater monitoring wells. The proposed POD affects a surface area of approximately 21 acres, water usage is estimated at less than 20 acre-feet for project duration (~7 years) compared to over 500 acre-feet annually analyzed. Air emissions are estimated at 10 percent of CO-110-06-117-EA analysis for the 2nd Generation ICP Project. Therefore the effects of proposed project are less than what is analyzed in the EA, including cumulative impacts associated with the Proposed Action.

5. Are the public involvement and interagency review associated with existing NEPA document(s) adequate for the current Proposed Action?

Documentation of answer and explanation: Collaboration and public involvement for the Oil Shale R,D&D projects included:

- Public open houses in four communities - Rangely, Meeker, Rifle and Grand Junction;
- Endangered Species Act Section 7 consultation with the US Fish and Wildlife;
- Tribal notification;

- 30-day public review periods on the EA (August 15 through September 18, 2006)
- Monthly coordination meetings in the BLM Colorado State Office with state and federal agencies on the progress in the R,D&D effort.

INTERDISCIPLINARY REVIEW:

The Proposed Action was presented to, and reviewed by the White River Field Office interdisciplinary team on 1/11/2011. A list of resource specialists who participated in this review is available upon request from the White River Field Office.

REMARKS:

Cultural Resources: The project area has previously been redundantly covered by Class III (intensive) cultural resource inventories (Darnell 2006, Schwendler et al. 2008, &c.). No cultural resources have been identified within about 500 feet (150 meters) of the project area and no historic properties potentially Eligible for listing on the National Register of Historic Places have been located within 1,800 feet (about 550 meters) of the project area. The project has a negligible potential to affect historic properties. (GLH 3/9/2011)

Native American Religious Concerns: Uncertain of the status of past tribal consultation activities for CO-110-2006-117-EA, new consultation letters for CO-110-2006-117-EA and DOI-BLM-CO-110-2011-0042-DNA were sent to the Ute Tribe of the Uintah and Ouray Reservation, the Southern Ute Tribe, the Ute Mountain Ute Tribe, and the Eastern Shoshone Tribe on 1/28/2011. Follow-up phone calls were placed to tribal Business Committee Chairmen, cultural resources specialists, and/or Tribal Historic Preservation Officers on 3/9/2011. As of 3/9/2011, no reply has been received. Currently, no Native American Religious Concerns or Traditional Cultural Properties are known in or near the project area. Should future consultations or other communications with tribal authorities reveal the existence of such sensitive properties, appropriate mitigation and/or protection measures may be undertaken. (GLH 3/9/2011)

Threatened and Endangered Wildlife Species: All wildlife related issues and concerns are adequately addressed in the original environmental assessment (CO-110-2006-117-EA). A Biological Opinion was received from the US Fish and Wildlife Service (FWS) on September 12, 2006 concerning small water depletions associated with implementation of the Shell Oil Shale RD&D project. At that time the FWS determined that the project fit under the umbrella of the BLM's Programmatic Biological Assessment and would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts to the Upper Colorado River Basin as the depletion amount was less than 100 AF. As a result, the proponent made a one-time contribution to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) in the amount equal to the average annual acre-feet depleted by the project (25AF/year). The depletion fee for this project has already been paid and the project has been entered into the White River Field Office fiscal year 2007 water depletion log. (LB 01/25/11)

Threatened and Endangered Plant Species: Potential impacts to Threatened and Endangered plant species were adequately analyzed in Environmental Assessment CO-110-2006-117-EA.

There are no additional impacts or concerns related to special status plant species associated with this Proposed Action

Vegetation: To be consistent with the 2011 “White Rive Field Office Surface Reclamation Protocol” the following seed mix should be implemented. (TT 07/07/2011)

| Cultivar | Species | Scientific Name | Application Rate (lbs PLS/acre) |
|-----------------|----------------------|---|--|
| Arriba | Western Wheatgrass | <i>Pascopyrum smithii</i> | 4 |
| Rimrock | Indian Ricegrass | <i>Achnatherum hymenoides</i> | 3.5 |
| Whitmar | Bluebunch Wheatgrass | <i>Pseudoroegneria spicata ssp. inermis</i> | 4 |
| Lodorm | Green Needlegrass | <i>Nassella viridula</i> | 2.5 |
| Timp | Northern Sweetvetch | <i>Hedysarum boreale</i> | 3 |
| | Sulphur Flower | <i>Eriogonum umbellatum</i> | 1.5 |
| Alternates:* | | | |
| Critana | Needle and Thread | <i>Elymus lanceolatus ssp. lanceolatus</i> | 3 |
| | Scarlet Globemallow | <i>Sphaeralcea coccinea</i> | 0.5 |

REFERENCES CITED:

Darnell, Nicole

2006 Class III Cultural Resources Inventory of a 160-Acre Block Area for the 2nd Generation ICP Site in Rio Blanco County, Colorado, for Shell Frontier Oil and Gas. Grand River Institute, Grand Junction, Colorado. WRFO CRIR# 06-11-10, SHPO # RB.LM.NR1799.

Schwendler, Rebecca, Sarah Baer, Karen Reed, Scott Phillips, Scott Slessman, Matthew Bandy, Nicole Kromarek, Scott Bowen, Max Wolk, Caryn M. Berg, Paul Burnett, Tom Witt, Sean Doyle, Michelle Delmas, Michael Cregger, John Kennedy, Judy Cooper, Zonna Barnes, Amanda Cohen, Cynthia Manseau, Michael Retter, Dan Shosky, and Erin Salisbury

2008 A Class III Cultural Resource Inventory for the Ryan Gulch 3-D Geophysical Exploration Project, Rio Blanco County, Colorado. SWCA Environmental Consultants, Broomfield, Colorado. WRFO CRIR# 09-127-01, SHPO # RB.LM.R1083.

U. S. Department of Interior Bureau of Land Management White River Field Office
2011 White River Field Office Surface Reclamation Protocol

MITIGATION:

The Proposed Action is subject to Oil Shale Research, Development and Demonstration (R,D&D) Lease COC69166 Section 25 Special Stipulations and the following:

1. The permittee is responsible for informing all persons who are associated with the project operations that they will be subject to prosecution for knowingly disturbing archaeological sites, or for collecting artifacts.
2. If any archaeological materials are discovered as a result of operations under this authorization, activity in the vicinity of the discovery will cease, and the BLM WRFO Archaeologist will be notified immediately. Work may not resume at that location until approved by the AO. The proponent will make every effort to protect the site from further impacts including looting, erosion, or other human or natural damage until BLM determines a treatment approach, and the treatment is completed. Unless previously determined in treatment plans or agreements, BLM will evaluate the cultural resources and, in consultation with the State Historic Preservation Officer, select the appropriate mitigation option within 48 hours of the discovery. The proponent, under guidance of the BLM, will implement the mitigation in a timely manner. The process will be fully documented in reports, site forms, maps, drawings, and photographs. The BLM will forward documentation to the SHPO for review and concurrence.
3. Pursuant to 43 CFR 10.4(g) the holder of this authorization must notify the AO, by telephone and written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43 CFR 10.4(c) and (d), you must stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the AO.
4. The permittee is responsible for informing all persons who are associated with the project operations that they will be subject to prosecution for disturbing or collecting vertebrate fossils, collecting large amounts of petrified wood (over 25lbs./day, up to 250lbs./year), or collecting fossils for commercial purposes on public lands.
5. If any paleontological resources are discovered as a result of operations under this authorization, the proponent or any of his agents must stop work immediately at that site, immediately contact the BLM Paleontology Coordinator, and make every effort to protect the site from further impacts, including looting, erosion, or other human or natural damage. Work may not resume at that location until approved by the AO. The BLM or designated paleontologist will evaluate the discovery and take action to protect or remove the resource within 10 working days. Within 10 days, the operator will be allowed to continue construction

through the site, or will be given the choice of either (a) following the Paleontology Coordinator's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or (b) following the Paleontology Coordinator's instructions for mitigating impacts to the fossil resource prior to continuing construction through the project area.

6. Any excavations into the underlying native sedimentary stone must be monitored by a permitted paleontologist. The monitoring paleontologist must be present before the start of excavations that may impact bedrock.

7. The following seed mix shall be implemented.

| Cultivar | Species | Scientific Name | Application Rate (lbs PLS/acre) |
|-----------------|----------------------|---|--|
| Arriba | Western Wheatgrass | <i>Pascopyrum smithii</i> | 4 |
| Rimrock | Indian Ricegrass | <i>Achnatherum hymenoides</i> | 3.5 |
| Whitmar | Bluebunch Wheatgrass | <i>Pseudoroegneria spicata ssp. inermis</i> | 4 |
| Lodorm | Green Needlegrass | <i>Nassella viridula</i> | 2.5 |
| Timp | Northern Sweetvetch | <i>Hedysarum boreale</i> | 3 |
| | Sulphur Flower | <i>Eriogonum umbellatum</i> | 1.5 |
| Alternates:* | | | |
| Critana | Needle and Thread | <i>Elymus lanceolatus ssp. lanceolatus</i> | 3 |
| | Scarlet Globemallow | <i>Sphaeralcea coccinea</i> | 0.5 |

COMPLIANCE PLAN: "Plan of Development for Research, Development, and Demonstration Activities on Oil Shale research, development and Demonstration (RDD) Lease COC 69166 and Nahcolite Preference Right Sodium Lease C-0120057"

NAME OF PREPARER: Paul Daggett

NAME OF ENVIRONMENTAL COORDINATOR: Heather Sauls

DATE: 8/4/2011

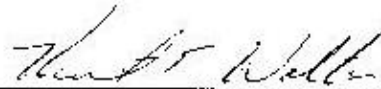
ATTACHMENTS: Location Maps

CONCLUSION

DOI-BLM-CO-110-2011-0042-DNA

Based on the review documented above, I conclude that this proposal in consort with the applied mitigation conforms to the land use plan and that the NEPA documentation previously prepared fully covers the Proposed Action and constitutes BLM's compliance with the requirements of NEPA.

SIGNATURE OF RESPONSIBLE OFFICIAL:



Field Manager

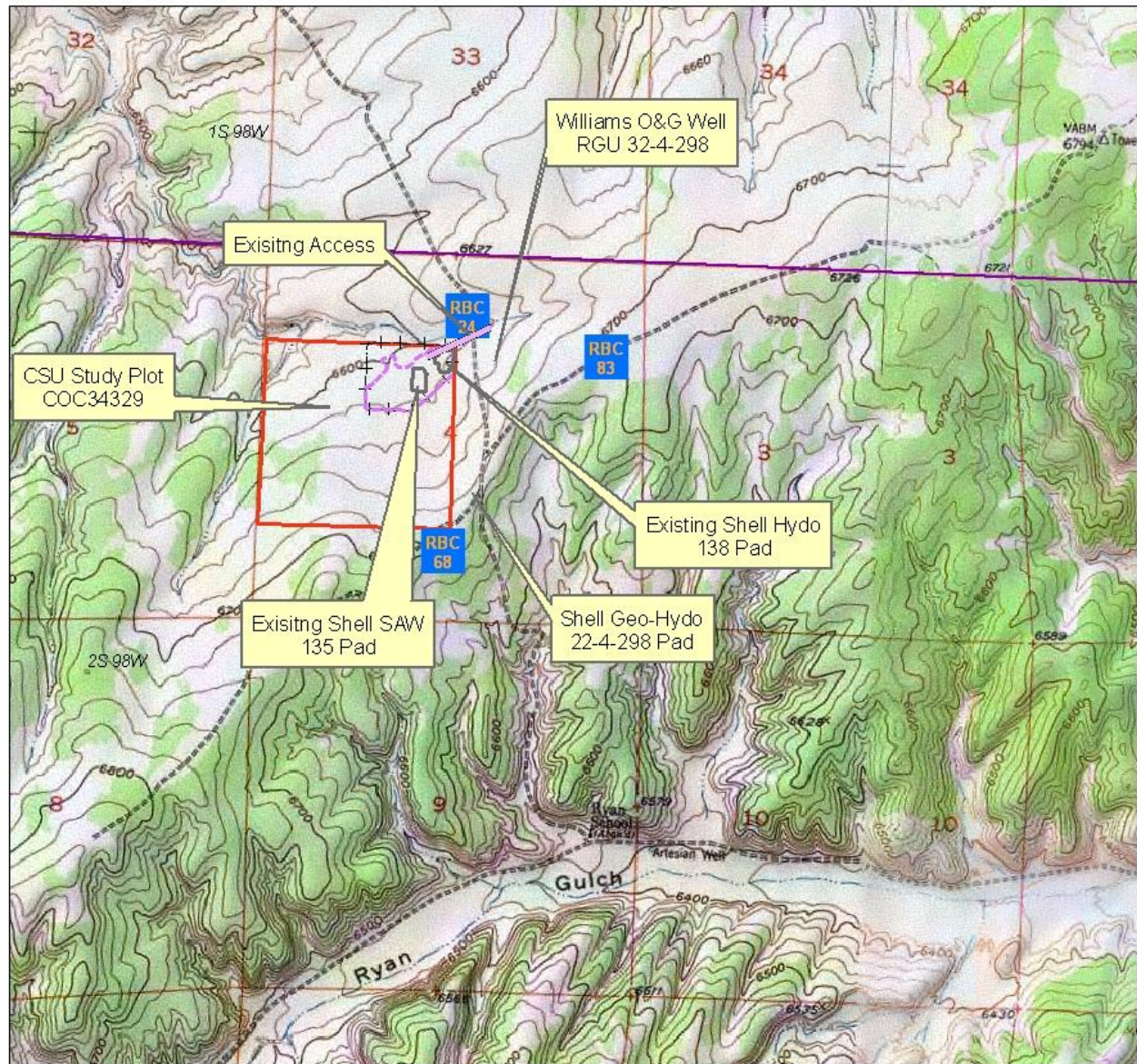
DATE SIGNED:

⁷⁶
08/04/2011

Note: The signed Conclusion on this worksheet is part of an interim step in the BLM's internal decision process and does not constitute an appealable decision.

DOI-BLM-CO-110-2011-0042-DNA

Shell Frontier Oil Shale RDD POD COC69166



01/10/2011

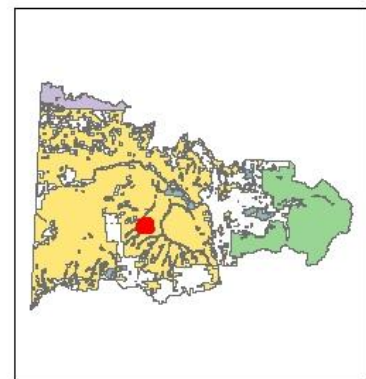
T2 S, R98 W, 6th P.M.
Sec. 4: Lots 9, 10, 15, and 16



- Facility Disturbance area
- POD fenced area
- Shell RDD COC69166

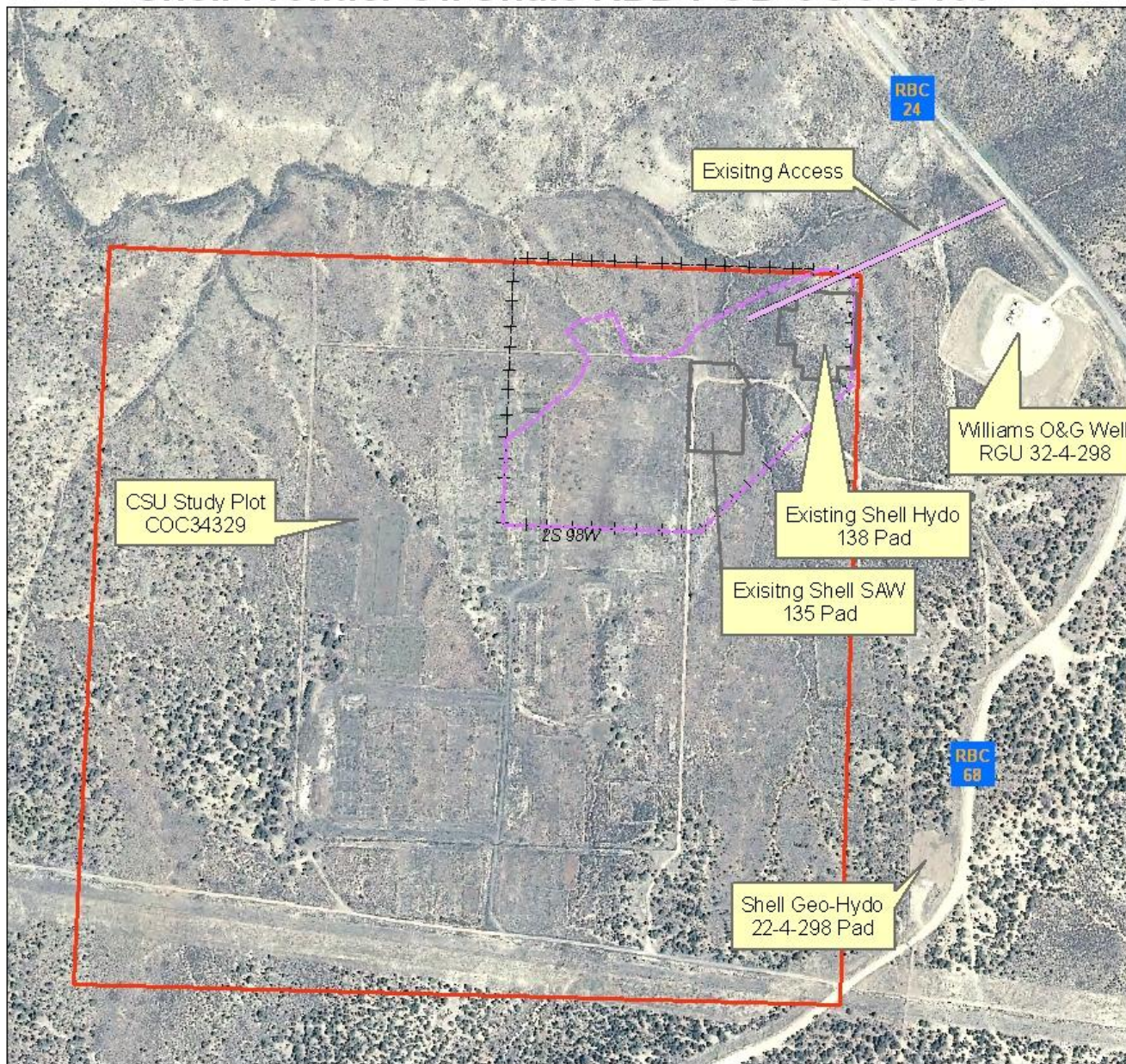
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DOI-BLM-CO-110-2011-0042-DNA

Shell Frontier Oil Shale RDD POD COC69166



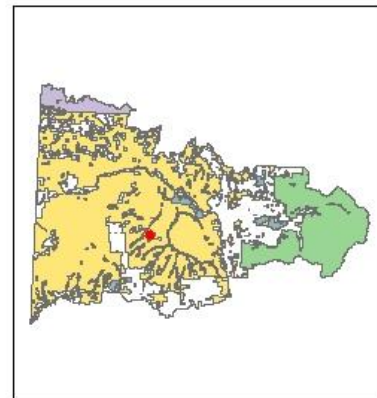
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**T2 S, R98 W, 6th P.M.
Sec. 4: Lots 9, 10, 15, and 16**



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-  Facility Disturbance area
-  POD fenced area
-  Shell RDD COC69166